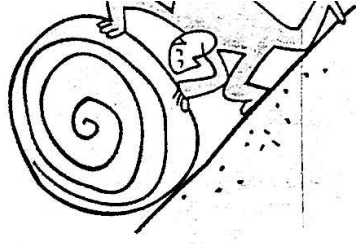


Kinetic & Potential Energy



PART 1: CONCEPTS

- Describe the relationship between motion and energy.

As KE ↑, motion ↑ and visa versa

- What kind of energy is represented by an archer stretching a bow string?

Increasing potential Energy.

- How are kinetic and potential energy different?

↓
Movement/motion Stored Energy.



- Can an object have both kinetic and potential energy at the same time? Explain.

yes.

↑
Ans will vary

- How does the potential energy of an object change when its height is tripled?

It will triple (3x)

- How does the kinetic energy of an object change when its velocity is tripled?

It will be 9x →

$$KE = \frac{1}{2}mv^2 \quad (3)^2 = 9$$

PART 2: CALCULATIONS Be sure to write out the formula in symbols and include units in your work!

- A 60 kg person walks from the ground to the roof of a 74.8 m tall building. How much gravitational potential energy does she have at the top of the building?

<p>GIVEN:</p> <p>$m = 60 \text{ kg}$ $g = 10 \text{ m/s}^2$ $h = 74.8 \text{ m}$</p> <p>FORMULA:</p> <p>$PE = mgh$</p>	<p>WORK:</p> <p>$PE = mgh$ $= 60 \cdot 10 \cdot 74.8$ $= 44,880 \text{ J}$</p> <p>ANSWER: 44,880 J</p>
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8. A pitcher throws a 0.145 kg baseball at a velocity of 30 m/s. How much kinetic energy does the ball have?

<p>GIVEN:</p> <p>$m = .145 \text{ kg}$</p> <p>$v = 30 \text{ m/s}$</p> <p>FORMULA:</p> <p>$KE = \frac{1}{2}mv^2$</p>	<p>WORK:</p> <p>$KE = \frac{1}{2}mv^2$</p> <p>$KE = \frac{1}{2}(.145)(30^2)$</p> <p>$= 65.25$</p> <p>ANSWER: 65.25 J</p>
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9. The kinetic energy of a bowling ball traveling at a speed of 4 m/s is 50 joules. Find the mass of the ball.

<p>GIVEN:</p> <p>$m = ?$</p> <p>$v = 4 \text{ m/s}$</p> <p>$KE = 50 \text{ J}$</p> <p>FORMULA:</p> <p>$KE = \frac{1}{2}mv^2$</p>	<p>WORK:</p> <p>$KE = \frac{1}{2}mv^2$</p> <p>$\frac{2KE}{v^2} = m$</p> <p>$\frac{2(50)}{4^2} = m$</p> <p>6.25</p> <p>ANSWER: 6.25 kg</p>
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10. The gravitational potential energy of a 15 kg object is 294 joules. What is the height of the object above the ground?

<p>GIVEN:</p> <p>$PE = 294 \text{ J}$</p> <p>$m = 15 \text{ kg}$</p> <p>$g = 10 \text{ m/s}$</p> <p>$h = ?$</p> <p>FORMULA:</p> <p>$PE = mgh$</p>	<p>WORK:</p> <p>$PE = mgh$</p> <p>$\frac{PE}{mg} = h$</p> <p>$\frac{294}{(15)(10)} = h$</p> <p>1.96 m</p> <p>ANSWER: 1.96 m</p>
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11. What is the speed of a 48 kg dog running across a lawn with 216 joules of kinetic energy?

<p>GIVEN:</p> <p>$KE = 216 \text{ J}$</p> <p>$m = 48 \text{ kg}$</p> <p>$v = ?$</p> <p>FORMULA:</p> <p>$KE = \frac{1}{2}mv^2$</p>	<p>WORK:</p> <p>$KE = \frac{1}{2}mv^2$</p> <p>$\sqrt{\frac{2KE}{m}} = v$</p> <p>$\sqrt{\frac{2(216)}{48}} = 3 \text{ m/s}$</p> <p>ANSWER: 3 m/s</p>
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